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Creel Census and Biological Data Taken from the Sport Fishery for Arctic Charr, *Salvelinus alpinus* (L.), at Freshwater Creek, Northwest Territories, 1981 - 1983

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1991

Canadian Data Report of
Fisheries and Aquatic Sciences
No. 851

Fisheries and Oceans Pêches et Océans

Canada

92-00627/

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Canadian Data Report of

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CREEL CENSUS AND BIOLOGICAL DATA TAKEN FROM THE SPORT FISHERY FOR ARCTIC CHARR, *Salvelinus alpinus* (L.), AT FRESHWATER CREEK, NORTHWEST TERRITORIES, 1981 - 1983

by

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This is the 62nd Data Report

from the Central and Arctic Region, Winnipeg

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Cat. no Fs 97-13/851E ISSN 0706-6465

Correct citation for this publication is:

Carder, G.W. 1991. Creel census and biological data taken from the sport fishery for Arctic charr, Salvelinus alpinus (L.), at Freshwater Creek, Northwest Territories, 1981-1983. Can. Data Rep. Fish. Aquat. Sci. 851: iv + 13 p.

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ABSTRACT

Carder, G.W. 1991. Creel census and biological data taken from the sport fishery for Arctic charr, Salvelinus alpinus (L.), at Freshwater Creek, Northwest Territories, 1981-1983. Can. Data Rep. Fish. Aquat. Sci. 851: iv + 13 p.

Data from the creel census and biological sampling program at Freshwater Creek, Northwest Territories during 1981, 1982 and 1983 are presented. In 1981 and 1982 a partial creel census was conducted at the creek. In 1981 interviews were conducted with 354 anglers who spent 533 hours angling, with a success rate of 0.56 per angler or 0.37 charr per angler hour to catch 197 Arctic charr. In 1982 interviews were conducted with 356 anglers who spent 782 hours angling, with a success rate of 0.82 per angler or 0.37 charr per angler hour to catch 293 Arctic charr. In 1983 the creel census covered the total angling period of June 24 to September 5. A partial creel was taken during the period of September 6 to September 13. In 1983 interviews were conducted with 1606 anglers who spent 3294 hours angling with a success rate of 0.42 per angler or 0.21 charr per angler hour to catch 678 Arctic charr. No biological information was collected during 1981 and 1982. Biological information collected during 1983 includes length, weight, sex and stage of maturity.

Key words: angling; sport fishing; fishery management; monitoring.

RÉSUMÉ

Carder, G.W. 1991. Creel census and biological data taken from the sport fishery for Arctic charr, Salvelinus alpinus (L.), at Freshwater Creek, Northwest Territories, 1981-1983. Can. Data Rep. Fish. Aquat. Sci. 851: iv + 13 p.

On présente des données obtenues dans le programme de rendement de la pêche et d'échantillonnage biologique effectué à Freshwater Creek dans les Territoires du Nord-Ouest en 1981 , 1982 et 1983. Au cours des années 1981 et 1982, un rendement de la pêche partiel a été réalisé à cet endroit. En 1981, on a interrogé 354 pêcheurs qui avaient consacré 533 heures à la pêche sportive, avaient connu un taux de succès de 0,56 par pêcheur ou 0,37 omble par heure de pêche et avaient capturé 197 ombles chevalier. En 1982, on a interrogé 356 pêcheurs qui avaient consacré 782 heures à la pêche sportive, avaient connu un taux de succès de 0,82 par pêcheur ou 0,37 omble par heure de pêche et avaient capturé 293 ombles chevalier. En 1983, le rendement de la pêche visait la période totale de pêche sportive, du 24 juin au 5 septembre. Un rendement de la pêche partiel a été effectué du 6 au 13 septembre. En 1983, on a interrogé 1606 pêcheurs qui avaient consacré 3294 heures à la pêche sportive, avaient connu un taux de succès de 0,42 par pêcheur ou 0,21 omble par heure de pêche et avaient capturé 678 ombles chevalier. Aucune donnée biologique n'a été recueillie en 1981 et en 1982. Les données biologiques recueillies en 1983 comprennent la longueur, le poids, le sexe et le degré de maturité.

Mots-clés : pêche sportive; gestion des pêches; surveillance.

INTRODUCTION

Historically the Inuit of the Cambridge Bay area (Fig. 1) fished Ekalluk River and Freshwater Creek for Arctic charr, Salvelinus alpinus (L.), and Ferguson Lake for lake trout, Salvelinus namaycush (Walbaum)(Barlishen and Webber 1973).

In 1960 the federal Department of Northern Affairs and National Resources conducted a test fishery in the Cambridge Bay area to determine the feasibility of commercial fishing, primarily for anadromous Arctic charr. The test fishery was successful; local demand for Arctic charr was found to be high and interest was stimulated amongst the Inuit of the area to fish the following year (Barlishen and Webber 1973).

The Department of Fisheries and Oceans (DFO) established a 10 400 kg Arctic charr quota for the Cambridge Bay area in 1961. In 1962, commercial fishing at Freshwater Creek was discontinued due to evidence of excessive harvest (overfishing) and commercial fishing was moved to the Ekalluk River (Barlishen and Webber 1973). In following years, quotas were granted to other waterbodies. For a more detailed history of the development of commercial fishing in the Cambridge Bay area see Barlishen and Webber (1973) and Kristofferson and Carder (1980).

Fisheries and Oceans began monitoring the commercial catch in the Cambridge Bay area in 1971. Information collected annually since 1971 has been used to establish quotas on various fish stocks in the area (Carder 1981; 1983; 1988; 1991; Carder and Low 1985; Carder and Stewart 1989; Kristofferson and Carder 1980).

In 1978, a stock assessment program was initiated in the Cambridge Bay area to identify separate fish stocks, to identify the size of the migrating component of each stock and to determine the relative contribution of each stock to the commercial fishery (Kristofferson et al. 1984; McGowan 1990).

In 1981 as part of on-going studies conducted in the Cambridge Bay area (McGowan 1990), DFO commenced studies at Freshwater Creek. During 1981 and 1982 partial creel census data were gathered and in 1983 total creel census data was obtained. In addition, fish weirs were used in 1982 and 1988 to enumerate the migrating Arctic charr population in the creek (D. McGowan, DFO, Winnipeg, personal communication).

This report presents data collected during the 1981, 1982 and 1983 creel census programs.

MATERIALS AND METHODS

DESCRIPTION OF THE FISHERY

Freshwater Creek is located near the community of Cambridge Bay (Fig. 1). It flows through the tundra from Grenier Lake to the sea, a distance of approximately 7 kilometers (Fig. 2). Angling can occur anywhere along the creek. However, the majority of angling occurs near or at the mouth. Most fish are caught by anglers from shore. Fishing from freighter canoes or skiffs anchored in the river mouth is limited.

CREEL CENSUS

During 1981 and 1982 partial creel census programs were conducted at the creek. Interviews were conducted randomly over part of the angling season. The primary purpose of the study was to determine whether or not there was a significant amount of angling occurring at the creek. Interviews were conducted during the periods July 3 - August 26, 1981 and July 8-August 27, 1982. In 1983, DFO personnel camped at the mouth of the creek and conducted a total creel census during the period June 24 to September 5 and a partial census during the period September 6-13. The location of the campsite (Fig. 2) was chosen so that an access point survey (Malvestuto 1983) could be carried out. Fishermen were interviewed at the end of their fishing trip. Each was questioned about the length of time spent fishing, the species of fish caught, the numbers of fish caught, released and retained. Whenever possible, retained catch was sampled for biological analysis. No biological samples were obtained during 1981 and 1982.

In addition to Arctic charr, fish species reported were lake trout and codfish sp. Three species of codfish inhabit the waters of Cambridge Bay, the polar cod, Arctogadus glacialis (Peters), the east Siberian cod, Arctogadus borisovi Drjagin, and the Greenland cod, Gadus ogac (Boulva 1972). The species caught during the study were not identified.

BIOLOGICAL SAMPLING

Arctic charr were sampled for fork length (±1 mm) and round weight (±50 g). Whenever possible information was obtained on age, sex and stage of maturity. Sagittal otoliths were taken and stored dry in coin envelopes. In the laboratory they were ground on a fine carborundum stone and placed in benzyl benzoate for clearing before being read under a binocular

dissecting microscope (30x). A reflecting light source against a black background was used to highlight the annual growth zones which were counted to estimate the age. The method of age estimation follows Grainger (1953).

Relative condition factor (K) was calculated using the formula:

$$K = \frac{W \times 10^5}{L^3}$$

where:

W = round weight in grams

L = fork length in millimeters

DATA ANALYSIS

Data were analyzed using a Micro Vax II computer. The Statistical Analysis System (SAS 1985) was used to generate length, weight, age, sex and stage of maturity summaries and to perform basic calculations and statistical analysis.

RESULTS

Creel census summary information is presented in Tables 1-8. Biological data are presented in Tables 9-11. All length tables indicate the lower boundary of the length interval (e.g. 350 indicates the length interval 350-399).

ACKNOWLEDGMENTS

The author wishes to thank the anglers of Cambridge Bay for their assistance and co-operation during the years 1981-1983. Assistance was also provided by Mr. R. Connelly and staff of the departments of Economic Development and Tourism, and Renewable Resources, Government of the Northwest Territories, Cambridge Bay.

Assistance in the field was provided by P. Byrne (1983), L. Cherniak (1983), S. Cunningham (1983), W. Curzon (1982), P. Jenkins (1981), T. Rebizant (1983), and H. Zeller (1982). Thanks also to D. K. McGowan for his assistance during the summer of 1982.

A. H. Kristofferson provided scientific advice. A. H. Kristofferson and J. T. Strong reviewed the final draft of this report. Word processing was done by Danielle Carrie.

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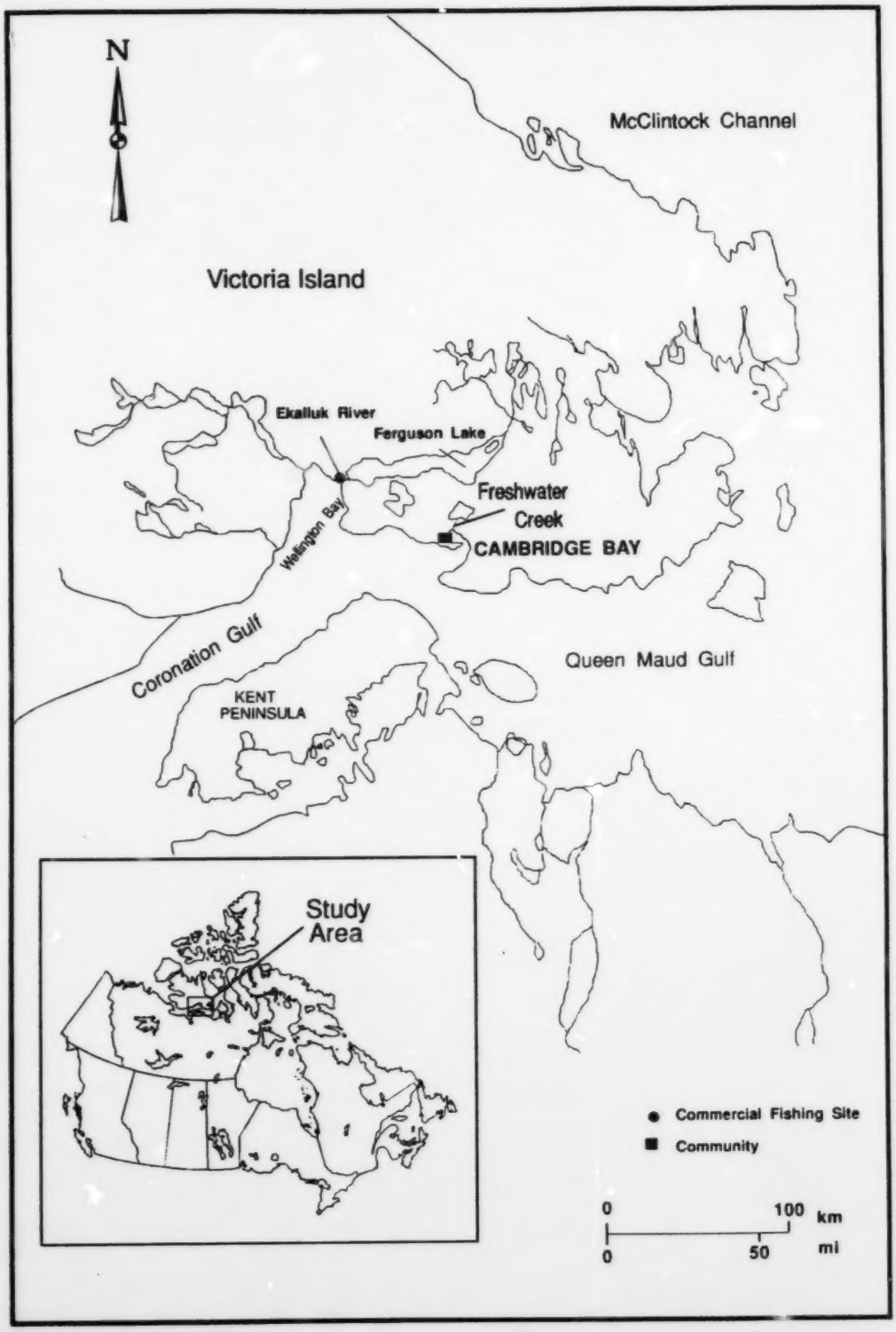

Fig. 1. Map of the Cambridge Bay area showing the location of Freshwater Creek.

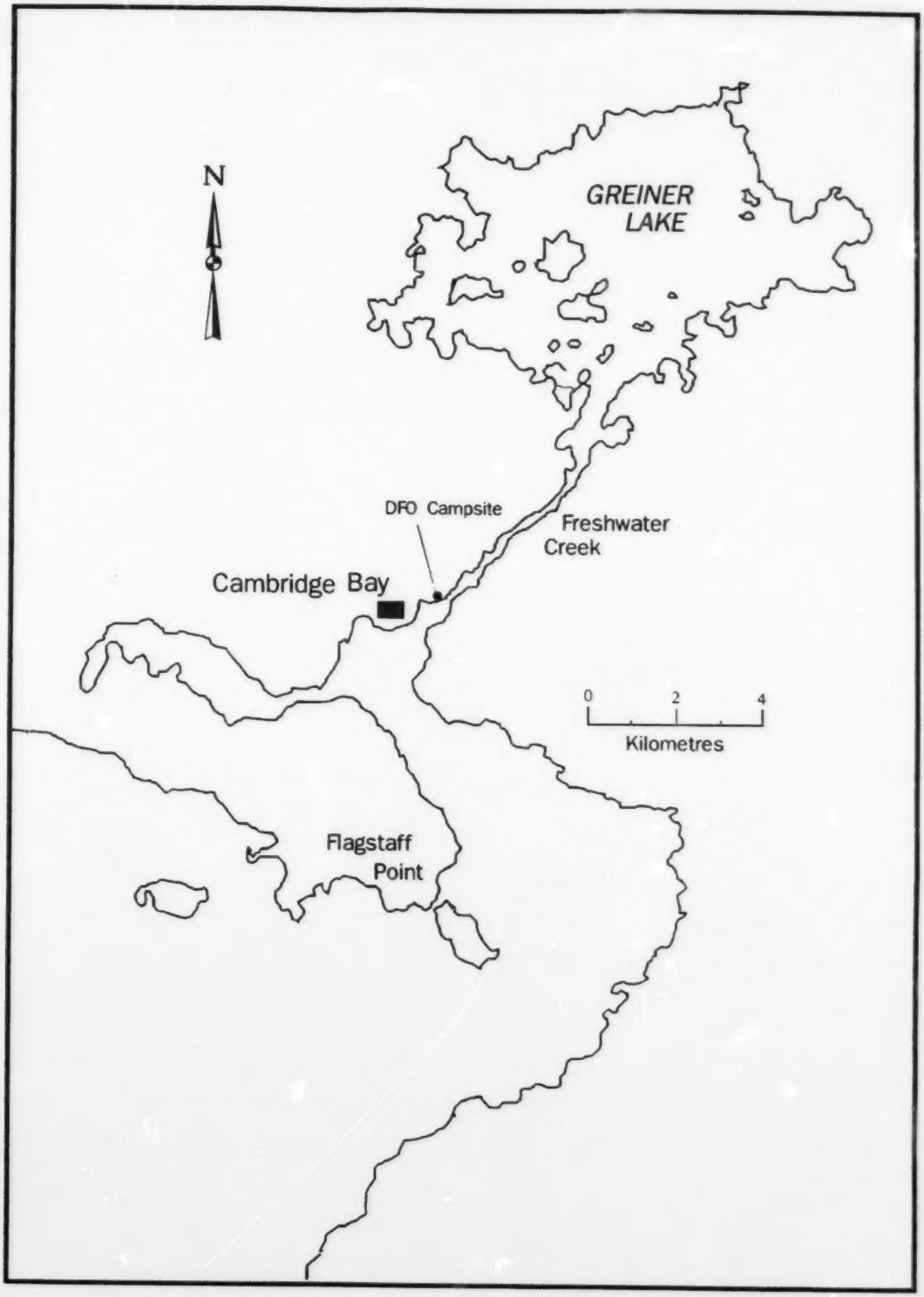

Fig. 2. Map of the Cambridge Bay area showing fishing areas on Freshwater Creek.

Table 1. Creel census summary of anglers at Freshwater Creek, July 3 - 31, 1981.

Date	No. of Angler Interviews	No. of Arctic charr Caught	Hours Fished	No. of Arctic charr Per Angler Interview	No. of Arctic charr Per Angler Hour
3	24	3	35.00	0.13	0.09
4	1	-	1.00	-	-
5	10	1	12.50	0.10	0.08
6	31	17	49.00	0.55	0.35
7	2	6	1.50	3.00	4.00
8	5	4	8.00	0.80	0.50
9	7	5	3.50	0.71	1.43
11	2	2	4.00	1.00	0.50
12	7	3	7.00	0.43	0.43
22	20	6	29.50	0.30	0.20
23	8	23	10.00	2.88	2.30
24	22	10	19.50	0.45	0.51
25	7	5	17.50	0.71	0.29
26	6	-	12.00	-	-
27	10	17	13.00	1.70	1.31
29	4	-	6.00	-	-
30	11	5	22.00	0.45	0.23
31	20	8	20.00	0.40	0.40
Total	197	115	271.00		
Mean				0.58	0.42

Table 2. Creel census summary of anglers at Freshwater Creek, August 1 - 26, 1981.

Date	No. of Angler Interviews	No. of Arctic charr Caught	Hours Fished	No. of Arctic charr Per Angler Interview	No. of Arctic charr Per Angler Hour
1	16	10	25.50	0.63	0.39
2	7	3	10.50	0.43	0.29
3	8	7	16.00	0.88	0.44
4	6	5	9.00	0.83	0.56
6	4	4	8.00	1.00	0.50
9	15	6	30.00	0.40	0.20
10	16	10	40.00	0.63	0.25
11	8	1	16.00	0.13	0.06
12	5	4	4.00	0.80	1.00
15	15	7	22.50	0.47	0.31
19	7	2	7.00	0.29	0.29
20	3	2	3.00	0.67	0.67
22	15	4	16.50	0.27	0.24
23	13	7	37.00	0.54	0.19
25	6	-	6.00	-	-
26	13	10	11.00	0.77	0.91
Total	157	82	262.00		
Mean				0.52	0.31

Table 3. Creel census summary of anglers at Freshwater Creek, July 8 - 31, 1982.

Date	No. of Angler Interviews	No. of Arctic charr Caught	Hours Fished	No. of Arctic charr Per Angler Interview	No. of Arctic charr Per Angler Hour
8	17	12	63.00	0.71	0.19
15	11	4	22.00	0.36	0.18
16	18	3	63.00	0.17	0.05
18	8	12	21.00	1.50	0.57
20	3	-	3.00	-	-
21	10	2	26.50	0.20	0.08
22	13	4	25.00	0.31	0.16
23	10	1	33.00	0.10	0.03
25	13	7	38.00	0.54	0.18
26	13	17	28.00	1.31	0.61
27	18	6	16.00	0.33	0.38
28	5	7	11.50	1.40	0.61
29	5	13	10.50	2.60	1.24
30	5	14	15.00	2.80	0.93
31	4	12	3.50	3.00	3.43
Total	153	114	379.00		
Mean				0.75	0.30

Table 4. Creel census summary of anglers at Freshwater Creek, August 1 - 27, 1982.

Date	No. of Angler Interviews	No. of Arctic charr Caught	Hours Fished	No. of Arctic charr Per Angler Interview	No. of Arctic charr Per Angler Hour
1	22	9	57.00	0.41	0.16
3	7	2	10.00	0.29	0.20
4	8	3	15.00	0.38	0.20
5	6	-	10.00	-	-
6	5	15	12.00	3.00	1.25
7	8	3	19.00	0.38	0.16
8	13	2	14.00	0.15	0.14
10	5	-	7.50	-	-
14	20	6	27.00	0.30	0.22
15	18	19	40.00	1.06	0.48
16	9	7	18.00	0.78	0.39
17	18	3	38.00	0.17	0.08
18	9	3	13.50	0.33	0.22
20	2	3	9.50	1.50	0.32
23	1	2	16.00	2.00	0.13
25	24	30	56.00	1.25	0.54
26	3	6	5.00	2.00	1.20
27	25	66	35.00	2.64	1.89
Total	203	179	402.50		
Mean				0.88	0.44

Table 5. Creel census summary of anglers at Freshwater Creek, June 24 - 30, 1983.

Date	No. of Angler Interviews	No. of Arctic Charr			No. of Lake Trout			No. of Codfish			Hours Fished	No. of Arctic Charr	
		C	R	K	C	R	K	C	R	K		Per Angler Interview	Per Angler Hour
24	12	6	-	6	-	-	-	-	-	-	23.25	0.50	0.26
25	22	9	-	9	-	-	-	-	-	-	53.00	0.41	0.17
26	84	66	-	66	4	-	4	-	-	-	261.75	0.79	0.25
27	72	46	-	46	-	-	-	3	-	3	123.75	0.64	0.37
28	39	29	2	27	4	-	4	1	-	1	81.75	0.74	0.35
29	52	13	-	13	-	-	-	-	-	-	93.50	0.25	0.14
30	55	10	-	10	-	-	-	-	-	-	124.25	0.18	0.08
Total	336	179	2	177	8	-	8	4	-	4	761.25		
Mean												0.53	0.24

C = caught
R = released
K = kept

Table 6. Creel census summary of anglers at Freshwater Creek, July 1 - 31, 1983.

Date	No. of Angler Interviews	No. of Arctic charr C	R	K	Hours Fished	No. of Arctic charr Per Angler Interview	Per Angler Hour
1	31	6	-	6	69.50	0.19	0.09
2	41	34	1	33	116.75	0.83	0.29
3	49	35	-	35	111.25	0.71	0.31
4	39	15	-	15	103.75	0.38	0.14
5	33	16	7	9	55.50	0.48	0.29
6	48	8	-	8	55.00	0.17	0.15
7	22	11	-	11	52.50	0.50	0.21
8	41	11	-	11	74.25	0.27	0.15
9	23	12	3	9	65.50	0.52	0.18
10	21	18	3	15	52.00	0.86	0.35
11	15	20	3	17	53.00	1.33	0.38
12	27	12	-	12	55.75	0.44	0.22
13	16	4	-	4	40.25	0.25	0.10
14	31	11	-	11	61.50	0.35	0.18
15	22	8	-	8	43.00	0.36	0.19
16	26	5	-	5	34.75	0.19	0.14
17	13	5	1	4	20.75	0.38	0.24
18	17	2	1	1	27.50	0.12	0.07
19	23	5	-	5	39.50	0.22	0.13
20	17	5	-	5	27.75	0.29	0.18
21	27	7	3	4	47.50	0.26	0.15
22	9	6	1	5	19.50	0.67	0.31
23	20	1	-	1	31.25	0.05	0.03
24	8	-	-	-	16.00	-	-
25	6	12	2	10	18.00	2.00	0.67
26	6	6	-	6	13.00	1.00	0.46
27	2	-	-	-	1.00	-	-
28	6	-	-	-	6.50	-	-
29	6	-	-	-	9.00	-	-
30	7	5	2	3	10.50	0.71	0.48
31	18	11	5	6	27.75	0.61	0.40
Total	670	291	32	259	1359.75		
Mean						0.43	0.21

C = caught
R = released
K = kept

Table 7. Creel census summary of anglers at Freshwater Creek, August 1 - 31, 1983.

Date	No. of Angler Interviews	No. of Arctic charr C	R	K	Hours Fished	No. of Arctic charr Per Angler Interview	Per Angler Hour
1	19	5	2	3	33.00	0.26	0.15
2	23	4	1	3	41.00	0.17	0.10
3	18	1	-	1	21.50	0.06	0.05
4	4	3	-	3	9.00	0.75	0.33
5	10	7	-	7	17.00	0.70	0.41
6	10	2	-	2	15.50	0.20	0.13
7	19	3	-	3	35.25	0.16	0.09
8	8	1	-	1	13.75	0.13	0.07
9	4	-	-	-	5.50	-	-
10	6	3	-	3	14.00	0.50	0.21
11	10	2	-	2	16.75	0.20	0.12
12	-	-	-	-	-	-	-
13	3	2	-	2	1.50	0.67	1.33
14	14	-	-	-	17.50	-	-
15	9	2	-	2	13.25	0.22	0.15
16	7	2	-	2	8.25	0.29	0.24
17	12	5	-	5	22.00	0.42	0.23
18	18	3	-	3	25.25	0.17	0.12
19	5	3	-	3	5.50	0.60	0.55
20	26	7	-	7	41.50	0.27	0.17
21	24	8	1	7	34.00	0.33	0.24
22	10	4	-	4	14.50	0.40	0.28
23	25	4	-	4	44.00	0.16	0.09
24	33	3	-	3	51.50	0.09	0.06
25	28	26	-	26	51.25	0.93	0.51
26	21	7	-	7	46.75	0.33	0.15
27	23	2	-	2	42.25	0.09	0.05
28	17	3	-	3	21.50	0.18	0.14
29	16	4	-	4	25.25	0.25	0.16
30	16	3	1	2	24.25	0.19	0.12
31	20	2	1	1	29.25	0.10	0.07
Total	458	121	6	115	741.50		
Mean						0.26	0.16

C = caught
R = released
K = kept

Table 8. Creel census summary of anglers at Freshwater Creek, September 1 - 13, 1983.

Date	No. of Angler Interviews	No. of Arctic charr C	R	K	Hours Fished	No. of Arctic charr Per Angler Interview	Per Angler Hour
1	30	8	-	8	60.00	0.27	0.13
2	20	17	1	16	55.25	0.85	0.31
3	20	10	-	10	64.50	0.50	0.16
4	20	6	-	6	65.00	0.30	0.09
5	27	30	-	30	136.50	1.11	0.22
6	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-
8	8	4	-	4	16.00	0.50	0.25
9	-	-	-	-	-	-	-
10	4	-	-	-	8.00	-	-
11	-	-	-	-	-	-	-
12	12	12	-	12	24.00	1.00	0.50
13	1	-	-	-	2.00	-	-
Total	142	87	1	86	431.25		
Mean						0.61	0.20

C = caught
R = released
K = kept

Table 9. Information on total catch for fish caught by angling by sport fishermen during the creel census period at Freshwater Creek, 1981 - 1983.

Date	No. of Angler Interviews	No. of Arctic Charr			No. of Lake Trout			No. of Codfish			Hours Fished	No. of Arctic Charr	
		C	R	K	C	R	K	C	R	K		Per Angler Interview	Per Angler Hour
1981	354	197	-	197	-	-	-	-	-	-	533.00	0.56	0.37
1982	356	293	-	293	-	-	-	-	-	-	781.50	0.82	0.37
1983	1606	678	41	637	8	-	8	4	-	4	3293.75	0.42	0.21

C = caught
R = released
K = kept

Table 10. Biological data by age group for Arctic charr angled at Freshwater Creek, 1983.

AGE	MALES							FEMALES							COMBINED						
	LENGTH(MM)			WEIGHT(G)			%	LENGTH(MM)			WEIGHT(G)			%	LENGTH(MM)			WEIGHT(G)			%
(YR)	N	MEAN	SD	MEAN	SD	K	MAT	N	MEAN	SD	MEAN	SD	K	MAT	N	MEAN	SD	MEAN	SD	K	MAT
6	1	323	-	350	-	1.04	0	1	285	-	250	-	1.08	0	2	304	26.9	300	71	1.06	0
7	8	340	22.4	388	74	0.98	0	6	359	50.6	492	218	0.99	0	15	346	36.7	430	150	1.01	0
8	4	436	24.1	788	144	0.95	75	7	407	53.1	686	276	0.98	29	11	417	45.5	723	234	0.96	45
9	6	428	40.9	842	213	1.05	33	10	436	30.5	880	257	1.04	60	16	433	33.7	866	235	1.04	50
10	3	501	205.4	1800	2081	1.06	67	10	497	60.1	1220	508	0.95	70	13	498	98.7	1354	990	0.98	69
11	12	563	123.6	2125	1335	1.05	75	8	579	82.2	1969	745	0.98	100	20	570	106.8	2063	1114	1.03	85
12	21	666	94.1	3190	1269	1.02	90	14	604	93.2	2368	928	1.04	93	35	641	97.4	2861	1201	1.03	91
13	17	624	102.9	2602	1186	1.01	94	10	596	90.3	2345	1172	1.03	100	28	609	98.9	2435	1205	0.99	93
14	9	669	71.8	3172	952	1.04	89	10	578	87.9	1815	635	0.92	100	19	621	91.2	2458	1044	0.97	95
15	10	730	42.3	3670	735	0.93	100	8	655	63.8	2681	1055	0.93	100	18	697	64.0	3231	1000	0.93	100
16	5	647	127.2	2770	1431	0.93	80	1	684	-	3000	-	0.94	100	6	653	114.8	2808	1284	0.93	83
17	2	714	14.8	3125	177	0.86	100	-	-	-	-	-	-	-	2	714	14.8	3125	177	0.86	100
19	3	765	27.3	4500	1250	1.00	100	1	642	-	1800	-	0.68	100	4	734	65.3	3825	1692	0.92	100
TOTAL	101							86							189						
MEAN		599	145	2501	1482	1.00			535	117.0	1695	1030	0.98			568	137.3	2113	1356	0.99	
MEAN AGE	11.8																				

Table 11. Biological data by length group for Arctic charr angled at Freshwater Creek, 1983.

LENGTH	MALES						FEMALES						COMBINED					
INTERVAL	LENGTH(MM)	WEIGHT(G)				%	LENGTH(MM)	WEIGHT(G)				%	LENGTH(MM)	WEIGHT(G)				%
(MM)	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT
250	1	296	300	-	1.16	0	2	281	225	35	1.02	0	3	286	250	50	1.06	0
300	4	331	375	50	1.03	0	3	315	283	58	0.90	0	8	323	344	65	1.02	0
350	9	367	489	105	0.98	0	9	386	572	44	0.99	11	18	377	531	85	0.99	6
400	8	424	788	127	1.03	38	12	422	775	120	1.02	67	20	423	780	120	1.02	55
450	14	474	1095	145	1.03	64	16	467	1069	323	1.04	69	31	470	1062	269	1.01	65
500	4	530	1463	125	0.99	75	11	527	1395	196	0.95	100	15	528	1413	178	0.96	93
550	8	581	2013	205	1.03	88	19	571	1839	339	0.98	100	28	575	1886	307	0.99	93
600	17	631	2629	486	1.04	100	14	629	2375	443	0.96	100	31	630	2515	477	1.00	100
650	16	672	3184	376	1.05	100	18	671	2903	499	0.96	94	34	672	3035	461	1.00	97
700	26	725	3660	573	0.96	100	8	713	3381	589	0.93	100	34	722	3594	580	0.95	100
750	20	771	4488	606	0.98	100	1	767	5000	-	1.11	100	24	769	4496	606	0.99	88
800	1	835	5250	-	0.90	100	-	-	-	-	-	-	2	837	5725	672	0.98	50
TOTAL	128						113						248					
MEAN		612	2622	1447	1.01			545	1776	1029	0.98			582	2251	1372	0.99	